

What is claimed is:

CLAIMS

- 1 1. An electrically continuous conformal EMI protective shield for adhering directly to and
2 conforming with surfaces of a printed circuit board comprising:
3 a thermally conductive dielectric coating adhering directly to surfaces of the printed
4 circuit board to provide an electrically nonconductive, thermally conductive, contiguous layer
5 over all such printed circuit board surfaces; and
6 a conductive coating adhering directly to surfaces of the dielectric coating to provide an
7 electrically conductive layer that prevents electromagnetic emissions from passing through
8 the conformal EMI protective shield.
- 1 2. The conformal EMI shield of claim 1, wherein the thermally conductive dielectric
2 coating comprises one of the group consisting of boron nitride (BN), aluminum oxide (AlO₃)
3 and magnesium oxide (MgO).
- 1 3. The conformal EMI shield of claim 1, wherein the thermally conductive dielectric
2 coating is formed from a thermally conductive dielectric dispersion comprising:
3 a base liquid;
4 a binder material suspended in the base liquid; and
5 a thermal loading material suspended in the base liquid.
- 1 4. The conformal EMI shield of claim 3,
2 wherein the thermal loading material comprises one of the group consisting of boron
3 nitride (BN), aluminum oxide (AlO₃) and magnesium oxide (MgO).
- 1 5. The conformal EMI shield of claim 3, wherein the binder material comprises one of the
2 group consisting of acrylic and urethane.
- 1 6. The conformal EMI shield of claim 3, wherein the base liquid and binder material are
2 provided in an intermediate dispersion subsequently doped with the thermal loading material.

- 1 7. The conformal EMI shield of claim 3, wherein the base liquid is one of either water or an
2 organic solvent.
- 1 8. The conformal EMI shield of claim 3, wherein the thermal loading material is 10%-80%
2 and the binder is 90%-20% by weight of the thermally conductive dielectric dispersion.
- 1 9. The conformal EMI shield of claim 3, wherein the thermal loading materials is a 0.1-10
2 micron Boron Nitride powder.
- 1 10. The conformal EMI shield of claim 3, wherein the thermal loading materials is a 100
2 mesh, 99% corundum, alpha-phase Aluminum Oxide powder.
- 1 11. The conformal EMI shield of claim 1, wherein the thermally conductive dielectric
2 coating has a viscosity of at least 45" #2 Zahn Cup (full body).
- 1 12. The conformal EMI shield of claim 1, wherein the thermally conductive dielectric
2 coating has a viscosity in the range of 50-100" #2 Zahn Cup (full body).
- 1 13. The conformal EMI shield of claim 1, wherein the thermally conductive dielectric
2 coating has an adhesion that enables it to pass the ASTM D-3359-83 Method A Tape Test
3 using a 1" (25 mm wide) semi-transparent pressure-sensitive tape with an adhesion strength
4 of 25-70 ounces per inch when tested in accordance with ASTM Test Method D-3330.
- 1 14. The conformal EMI shield of claim 1, wherein the thermally conductive dielectric
2 coating is 1.5-2.0 mils thick.
- 1 15. The conformal EMI shield of claim 1, wherein the thermally conductive dielectric
2 coating is formed from multiple applications each forming a 1 mil thick layer of thermally
3 conductive dielectric.

1 16. A printed circuit board (PCB) comprising:
2 a printed wiring board;
3 a plurality of components mounted on the printed wiring board; and
4 a conformal coating secured to surfaces of at least a region of the PCB, comprising:
5 a conductive coating, conformingly and adheringly disposed on the PCB
6 surfaces, that prevents electromagnetic waves from passing therethrough; and
7 a thermally conductive dielectric coating interposed between the conductive
8 coating and predetermined portions of the PCB surfaces so as to completely insulate
9 the predetermined PCB portions from current traveling through the conductive
10 coating.

1 17. The printed circuit board of claim 16, wherein the thermally conductive dielectric
2 coating comprises one of the group consisting of boron nitride (BN), aluminum oxide (AlO₃)
3 and magnesium oxide (MgO).

1 18. The printed circuit board of claim 16, wherein the thermally conductive dielectric
2 coating is formed from a thermally conductive dielectric dispersion comprising:
3 a base liquid comprising one of the group consisting of water and organic solvent;
4 a binder material suspended in the base liquid that comprises one of the group consisting
5 of acrylic and urethane; and
6 a thermal loading material suspended in the base liquid that comprises one of the group
7 consisting of boron nitride (BN), aluminum oxide (AlO₃) and magnesium oxide (MgO).

1 19. A method for coating a printed circuit board comprising:
2 providing a printed circuit board; and
3 conformingly adhering to the printed circuit board a continuous conformal coating for
4 providing a substantially EMI-impervious shield comprising,
5 a thermally conductive dielectric coating adhering directly to surfaces of the printed
6 circuit board to provide an electrically nonconductive, contiguous layer over all such
7 printed circuit board surfaces; and
8 a contiguous conductive coating adhering directly to surfaces of the dielectric
9 coating to provide an electrically conductive layer that prevents electromagnetic
10 emissions from passing through the conformal EMI protective shield.

1 20. The method of claim 19, wherein the thermally conductive dielectric coating comprises
2 one of the group consisting of boron nitride (BN), aluminum oxide (AlO₃) and magnesium
3 oxide (MgO).